Pawnee to Daniels Park 345kV Transmission Project

Utility Terms

1) Q. Who is Xcel Energy?

A. Xcel Energy is a major U.S. electric and natural gas company with regulated operations in eight Western and Midwestern states. Xcel Energy provides a comprehensive portfolio of energy-related products and services to 3.4 million electric customers and 1.9 million natural gas customers. As a point of clarification, the utility company name is “branded” as Xcel Energy; however, the legal owner and operator of the utility facilities in Colorado is Public Service Company of Colorado. All utility facilities and related land rights, including fee property, easements, permits, etc, are owned by operated by and held in the name of Public Service Company of Colorado, a Colorado Corporation (PSCo).

2) Q. What is a transmission line?

A. A transmission line is a high voltage electric line that delivers power from a generation station to a substation or between substations. Once the transmission line enters the substation, the voltage is reduced and power is transmitted over sub-transmission lines to distribution substations. The power is transformed again to a lower voltage for delivery to customers. Final transformation usually occurs near the user’s location.

3) Q. What is a substation?

A. Electric substations are a key component of any electric delivery system. Substations receive electric power from high voltage lines. Electrical equipment within the substations reduces, or “transforms”, higher voltage levels to lower voltage levels. Once the voltage is reduced, it is distributed to other substations or customers by way of electric distribution lines, or “feeders.”

4) Q. What is an easement?

A. An easement is defined as a permanent land right acquired by a person or party to use the land or property of another for a special or particular purpose. Landowners are paid a fair price for the easement and can continue to use the land for most uses, such as agriculture.

5) Q. What is the difference between a right-of-way (ROW) and an easement?

A. These terms are used interchangeably but an easement is a permanent land right and the right-of-way is the land area on which the facilities are located. For this project, the existing right-of-way is owned by PSCo in fee simple versus an easement interest. If someone owns a parcel of property in "fee simple," they

own that parcel of property outright; no other person can claim a greater right to use the property. The owner has certain rights, such as the right to use the land, give the land away and improve the land within the boundaries of local zoning ordinances.

6) Q. What determines the width of an easement?

A. Design and construction of transmission lines must be in compliance with the National Electric Safety Code. The voltage of the line and conductor (wire) positions determines the easement width. Also, there must be enough width for the sway of the conductors (wire) to be contained within the width of the easement under certain code requirements and to meet state regulations.

Colorado Transmission Policy and Regulation

7) Q. What is Colorado Senate Bill 07-100?

Colorado's 66th General Assembly passed Senate Bill 07-100 (SB 07-100) upon the recommendation of the 2006 Transmission Task Force on Reliable Electricity Infrastructure (Task Force). In its November 1, 2006 report, the Task Force recognized that "Colorado's ability to ensure the continued supply of affordable, reliable electricity and to build a vibrant economy depends on sufficient transmission capability." The Task Force indicated that the system is strained and, if current trends continue, there would not be adequate transmission to meet the electricity demand.

To address these concerns, the Task Force recommended:

1. Establishing a transmission cost recovery rider to create a robust and reliable transmission system to meet Colorado's future energy needs;
2. Increasing governmental involvement with organizations like the Colorado Coordinated Planning Group (CCPG);
3. Appropriating adequate funding for the Colorado Public Utilities Commission (CPUC) to actively participate in regional electricity transmission planning, reliability and regulatory forums.
4. Identifying renewable generation development areas within Colorado. In order to develop economic, safe, reliable and low-cost renewable electricity, the Task Force recommended that the state identify renewable generation development areas that have potential to support competition among renewable energy developers for development of renewable energy projects. In response to those recommendations, the Colorado legislature passed SB 07-100.

In 2007, Colorado Governor Bill Ritter signed into law SB 07-100, which established requirements for utilities to continually evaluate and, if necessary, improve electric transmission facilities to meet the state's existing and future

energy needs. SB 07-100 essentially seeks to expand Colorado's electric transmission system and promote the use of renewable resources.

SB 07-100 calls for the creation of Energy Resource Zones (ERZs), defined as geographic areas in which transmission constraints hinder the delivery of electricity to Colorado consumers, the development of new electric generation facilities to serve Colorado consumers, or both. Public Service Company of Colorado (PSCo) has identified five such zones where development interest has been shown in the past, and where there is significant potential for renewable generation from wind and solar resources.

SB 07-100 requires Colorado electric utilities that are subject to rate regulation by the CPUC to file, at least on a biennial basis, transmission development plans (SB 07-100 report). The plans are to consist of the following:

- Designation of ERZs
- Development of plans for the construction or expansion of transmission facilities necessary to deliver power consistent with the timing of energy resources located in or near such zones;
- Consideration of how transmission can be provided to encourage local ownership of renewable energy facilities; and,
- Submission of proposed plans and applications for a Certificate of Public Convenience and Necessity (CPCN) to the CPUC for review.

8) Q. How do the proposed SB100 projects accommodate the region's generation needs?

The proposed projects will help meet the goals of SB 07-100, which requires rate regulated utilities, such as PSCo, to plan transmission projects that accommodate the development of beneficial resources, including renewable generation.

9) Q. Are electric utilities in Colorado required to have a percentage of their electricity come from renewable energy sources?

The Colorado Renewable Portfolio Standard which was approved by voters in 2004 requires investor-owned utilities to provide specific percentages of renewable energy and/or recycled energy according to the following schedule:

- 3% of its retail electricity sales in Colorado for the year 2007;
- 5% of its retail electricity sales in Colorado for the years 2008-2010;
- 12% of its retail electricity sales in Colorado for the years 2011-2014;
- 20% of its retail electricity sales in Colorado for the years 2015-2019; and
- 30% of its retail electricity sales in Colorado for the year 2020 and each following year.

10) Q. What is a Certificate of Public Convenience and Necessity (CPCN)?

A. The Colorado Public Utilities Law and the rules of the CPUC require that an electric utility seeking to construct and operate an electric transmission line must first obtain a CPCN for the transmission line unless construction of the line is in the ordinary course of business in which case a CPCN is not needed for the transmission line project. The CPCN is granted if the CPUC determines that the present or future public convenience and necessity requires or will require such construction.

11) Q. How long does it take the CPUC to approve a project?

A. SB 07-100 states the CPUC must rule on an application filed pursuant to that statute within six months. If a CPCN application is not filed pursuant to that statute, the review process can take approximately nine to 12 months. The CPCN process does not decide the final location of the transmission line.

12) Q. Will a new transmission line be safe?

A. Every effort is made to ensure safety in construction, operation and maintenance of transmission lines. Lines and line infrastructure are designed to withstand extreme weather conditions. Protective devices at line terminals stop the electricity flow under any abnormal operating circumstances. Utility practices meet or exceed standards set by national electric safety codes as well as those adopted by local governments.

13) Q. Can structures be lowered to minimize the visual impact?

A. Structures are only as tall as they need to be to support the wires and to comply with all safety and operational requirements. Shorter structures result in a higher number of structures per mile.

14) Q. What noise pollution will emanate from the transmission line?

A. High voltage transmission lines do have a tendency to emit noise when they are wet, or can be affected by the condition of the air such as humidity, drizzle and fog. However, the proposed transmission lines were designed and built to operate within the noise parameters deemed reasonable by the Colorado Public Utilities Commission (CPUC). The CPUC state standards for noise in residential zones include operations at 50 decibels or less beyond a property line at a distance of 25 feet, and 55 decibels beyond a distance of 25 feet in commercial zones. For comparison, according to the Electric Power Research Institute, a typical business office operates at 50-60 decibels. To help mitigate noise, Xcel Energy designed the project using low-corona hardware to reduce noise. As noted in the Certificate of Public Convenience and Necessity (CPCN) approved by the CPUC, the noise curve is projected to increase with the addition of the second transmission line, but will still stay within approved standards. A graphic submitted with the CPCN shows projected noise levels with the first 230-kilovolt double circuit line, versus the additional new 345-kilovolt double circuit line, while staying in the required noise range (view graphic). According to the Bonneville

Power Administration (BPA), and as noted in the CPCN, there is a “burn in” period which can extend to a few months after a new transmission line is energized, which can increase the level of noise, due to residual grease or oil causing water to bead up on the surface of the conductor, producing temporarily higher levels of audible noise.

15) Q. What phenomena produce audible noise on high voltage transmission lines?

A. Several factors produce audible noise on high voltage transmission lines. Corona is a small electrical discharge, not unlike the static electrical charge that a person may experience when touching a metal object while walking on carpet. Corona is what creates the hissing, crackling or random popping sound. It increases substantially in wet weather, when water droplets form on a transmission line. All high voltage transmission lines experience corona during wet weather. In fair weather conditions, corona and its corresponding audible noise are usually at low levels. The higher the voltage on the transmission line, the greater the corona activity on the line.

16) Q. Will this interfere with the computer equipment or radios?

A. Corona on transmission line conductors can generate noise at the frequencies at which radio and television signals are transmitted. This noise can interfere with receiving of these signals and is called “radio interference” and “television interference” depending on the frequency.

Radio reception in the AM broadcast band (535 to 1605 KHz) is most often affected with what is commonly referred to as static. This problem typically occurs when we have loose hardware which can be corrected. There also may be AM radio interference when one is directly under the lines. FM radio reception is rarely affected. In the past, radio noise was a concern for the video portion of analog television signals; however, this is no longer the case in the United States because broadcast stations have switched to digital broadcasting and no longer transmit older analog AM video signals.

Corona effects from this project are expected to be low enough so that no objectionable audible noise or radio or television interference would result outside the right-of-way. If any problems do occur, transmission line maintenance activities are intended to locate and correct these problems as they occur. The line will use low corona hardware to minimize noise.

17) Q. What about the EMF health effects?

A. Electric and magnetic fields (EMF) are created by anything that conducts electricity, including transmission lines, household appliances and business equipment. These fields are strongest closest to their source, so the farther away you are from the source, the less EMF reaches your body. The EMF associated with a high voltage transmission line occurs mainly on the transmission line right-of-way since the electric and magnetic fields surround the conductor and decrease rapidly with increasing distance from the conductor. Magnetic fields travel through most materials including iron, steel, lead, and the soil. Magnetic

and electric field strengths drop rapidly as distance increases from the conductors such that at a few hundred feet from the line the fields are non-detectable. Depending on the flow of electrons, when there are two lines side by side, there can be cancellation of EMF. Magnetic fields are caused by current, not voltage. With a higher voltage more power is delivered with less current.

Considerable research and study has been done to investigate potential health effects of electric and magnetic fields (EMF) from high-voltage transmission lines on living organisms. Based on evidence to date, no biological hazards have been identified from EMF produced by electric transmission lines. Nevertheless, the proposed transmission line will be designed to operate within the EMF parameters deemed reasonable by the Colorado Public Utilities Commission. The proposed transmission line will also be designed and constructed to meet or exceed all applicable requirements of the National Electric Safety Code.

18) Q. Will this new transmission line cause an increase to the magnetic fields?

A. As part of the regulatory approval process, we provided the calculated magnetic field strength under three different scenarios to the Colorado Public Utilities Commission (PUC) as part of our Certificate of Public Convenience and Necessity (CPCN). The PUC declared magnetic field levels of 150 mG (milliGauss) and below measured at the edge of the transmission line ROW, at a location one meter above the ground are deemed reasonable. Rule 3206(e)(III). Based upon PUC rules, prior findings and comparative standards, Xcel Energy (Public Service Company) has shown the project is designed prudently to avoid magnetic fields. The levels provided in the CPCN, measured at the edge of the transmission line ROW, at a location one meter above the ground, were found to be reasonable by the PUC.

Purpose and Need for the Project

19) Q. Have studies been done to determine or justify the need for the proposed line?

A. PSCo continually reviews and analyzes its transmission system to determine if it's adequate to meet the needs of its customers. As a result of the passage in 2007 of Senate Bill 100, Public Service Company of Colorado (PSCo) must file a biennial resource plan every October 31. Each plan must designate energy resource zones; develop plans for transmission construction or expansion necessary to deliver energy from within or near those zones; consider how transmission availability can encourage ownership of renewable energy facilities; and submit proposed plans to the Colorado Public Utilities Commission for review. Since 2007, PSCo has included the proposed Pawnee-Daniels Park 345 kV line in its biennial resource plan.

20) Q. Does the Pawnee-Daniels Park project further facilitate dependence on coal resources?

A. Just the opposite, it enables the Company to access higher levels of natural gas and renewable energy such as wind and solar to the extent they are cost-effective for customers. The project will create a "backbone" between southern and northern Colorado, where PSCo operates large amounts of coal, gas and wind generation resources. It will also help ensure additional future energy from all of these generation resources can be delivered to all PSCo front-range customers.

21) Q. SB-100 was established to build transmission into renewable energy zones. Will the Pawnee-Daniels Park line create a delivery system or generation outlet for wind generation from Eastern and Northeastern Colorado?

A. Yes. As part of its 2013 All-Source Request for Proposal (RFP) the Company received proposals for approximately 2,675 MW of new wind generation facilities which sought to deliver to the Pawnee Substation located in Northeastern Colorado. Increased injection capability resulting from the Pawnee-Daniels Park transmission project is expected to help the Company cost-effectively comply with the State of Colorado's plan to meet the Environmental Protection Agency's Clean Power Plan which will require ongoing reductions in carbon dioxide emissions from the power generation sector.

22) Q. PSCo's load forecast shows the need for additional generation beginning in 2020, growing to over 600 MW in a few years, do the estimates take into consideration reductions in future load due to energy efficiency and conservation programs?

A. Yes. These projections for the need for additional generation account for the Company's plans for Energy Efficiency (EE) and conservation programs. The load forecast to which we optimize our generation portfolio is estimated to consist of approximately 65 MW of additional Demand Side Management (DSM) load reduction in 2015 in addition to the existing DSM on the PSCo system (approximately 511.0 as of Year End 2014). In Decision C14-0731, the Colorado PUC established a minimum annual electric energy savings goal of 400 GWh beginning in 2015. In order to reach this goal, PSCo estimates the corresponding annual DSM EE load reduction would be 65 MW.[1] Included below is a table of DSM demand and energy savings which are factored into the load forecast.

Annual and Cumulative EE Demand Reduction

Year	Annual Additional Demand Reduction (MW)	Cumulative Demand Reduction (MW)
2015	65.0	576.0
2016	65.0	641.0
2017	65.0	706.0
2018	65.0	771.0
2019	65.0	836.0
2020	65.0	901.0

We continue to aggressively pursue independent, large scale wind and solar generation for our system. The company has proposed adding 450 megawatts of wind and 170 megawatts of large scale solar in the next several years (our current system capacity including all generation and purchased power is about 7,800 megawatts).

Our Solar*Rewards program has paid out nearly $300 million for incentives and REC payments, but has added only slightly more than 190 megawatts to the grid since 2006. We have aggressively continued to add and have proposed to add another 36 megawatts of rooftop solar this year (and additional capacity of 6.5

[1] While forecasted annual demand reduction from energy efficiency may vary from the 65 MW goal, Decision No. C14-0731 at Paragraph 60 requires the Company to use demand reduction goals in the determination of resource needs within the ERP context.

megawatts for solar gardens) – but rooftop solar is not going to meet our total generation needs.

23) Q. What is the downside to this project not being approved and built in the timeframe that we have identified?

A. The transmission that exists in this corridor today has been in place for decades. Development and electric load growth in the southeast metro area has been very strong for many years and according to projections will continue in the future. Building transmission takes a long time (typically 7 to 10 years) because of the regulatory process and the need for robust and inclusive stakeholder outreach. While we are pleased the PUC granted the CPCN for the project, we do have concerns they delayed the start of construction until May 2020. The delay in the construction of the Harvest Mile Substation could have significant cost ramification for our customers. While we have in place right-of-way for the transmission portion of the project (if we build in the existing corridor between Harvest Mile and Daniels Park Substations), which will help minimize costs increases with the delay in construction, the later acquisition and construction of the substation has the potential to increase its costs by as much as 8 percent. Delaying the project could affect system reliability and the ability to bring energy resources to load.

24) Q. PSCo expects that natural gas-fired generation facilities in Northeast Colorado and new wind farms will be the supplies of choice, if so, why can't a new high voltage line be built to Smoky Hill where lower voltage feeder lines can supply the Aurora area? What is the benefit of building a 345kV line from Smoky Hill to Daniels Park? Are you not connecting into coal generation from Comanche?

A. By strengthening the transmission connection between the north and south system we are helping ensure that energy from all of our front range generation resources, both north and south (wind, gas and coal), can be delivered to our front-range customers. This new circuit will enhance system reliability by providing another transmission source into southeast metro area substations where load growth and development have been strong for many years and are predicted to continue. This will support that load growth by providing additional resources into substations serving customers. Substation transformers will take the 345kV voltage and lower it to a voltage that can serve customers.

25) Q. If so, how many MWs of wind generation are available in Northeast Colorado? With significant wind and gas-fired generation available in Northeast Colorado, why build a new 345kV line to Daniels Park that creates a "backbone" from Comanche and its coal resources to Pawnee?

A. Currently, we have approximately 1,250 MW of installed wind generation in Northeast Colorado. The ability to implement additional wind facilities in this wind rich region is limited by available injection capability (Pawnee). This project will

enable the interconnection of additional beneficial resources in NE Colorado and will bring that energy into the southeast metro area.

Project-Specific Information

26) Q. What is the expected in-service date for the proposed project?

A. May 31, 2022

27) Q. How tall are the transmission structures?

A. The transmission structures will be between 100 and 150 feet in height.

28) Q. How many more transmission lines will be constructed in this area?

A. Currently, we do not have any plans identified for new transmission lines in this area, other than the proposed project.

29) Q. What happens if the project is not built?

A. There are currently no viable contingency plans; therefore, reliable electric service may not be available to the area for existing and proposed developments, including new generation resources, under varying scenarios of growth and outages.

30) Q. Will this project improve our electric service?

A. Since this project is an addition to the high-voltage transmission system, it will improve overall system operations, performance and reliability – both locally and regionally.

31) Q. How will the proposed projects be funded?

A. The proposed projects will generally be funded through rates which are established and/or approved by the Colorado Public Utility Commission (CPUC).

32) Q. Will this project increase our rates?

A. The cost of these transmission line facilities is blended in with the cost of power and transmission lines from all of our facilities. We work hard to keep the cost of the electricity we provide to our customers as low as possible. As with all products and services, however, there is a constant upward pressure on costs, due to rising fuel prices, transportation prices, the cost of interest on borrowed money, etc.

33) Q. How much will the lines cost? Will my bills go up?

A. The proposed Pawnee-Daniels Park 345kV transmission line project will cost an estimated $178 million which includes the cost of building a new substation in Arapahoe County and modifications to three other substations. This is a scoping level estimate with an accuracy of +/- 30% and based on scope assumptions known at this time. Transmission costs generally make up 7 to 10 percent of a customer's bill. In that case, Xcel Energy residential customers can expect an incremental increase of about $0.59 per month and small commercial customers can expect an incremental increase of about $0.96 per month.

34) Q. What will it look like – color, heights, type of structure?

A. The structures for this project, regardless of route alternative, consist of either a gray colored galvanized steel or a self-weathering steel mono-pole similar in color to wood poles. The table below lists the transmission line characteristics.

Transmission Line Characteristics (Approximate Figures)	
Description of Design Component	Steel Mono-Pole Structures
Voltage	345kV
Right-of-Way Width (feet)	210
Average Span (feet)	Try to match existing, 800-1,200
Average Height of Structures (feet)	100 - 150
Average No. of Structures (per mile)	Try to match existing, 4 - 6
Minimum ground clearance at maximum operating temp. (feet)	34
Circuit Configuration	Double-Circuit Vertical
Conductor Type and Size (Cir Mils in Inches)	2 conductor vertical bundle 1272 ACSR per phase and 1 – 3/8” EHS & 1 OPGW

35) Q. Could the transmission line follow existing transmission/utility corridors?

A. One of the proposed alternative routes for the new 345 kilovolt (kV) line from the proposed Harvest Mile Substation to Daniels Park Substation will follow an existing 230kV line within a 210’ right-of-way, which is owned in fee simple by PSCo. If someone owns a parcel of property in "fee simple," they own that parcel of property outright; no other person can claim a greater right to use the property. The owner has certain rights, such as the right to use the land, give the land away and improve the land within the boundaries of local zoning ordinances. PSCo has completed a siting study identifying two feasible route alternatives other than the existing transmission/utility corridor.

36) Q. When was the existing 230kV transmission line that connects the Smoky Hill substation in Aurora and the Daniels Park Substation built?

A. The line was completed in 1968. At the time, the population of Aurora was nearly 70,000 and the population of Arapahoe County was approximately 150,000. Over the past 45 years, the 230kV line and other electrical infrastructure in the area has helped to fuel massive growth.. In 2012, the population of Aurora was 340,000, a 385% increase since 1968 and Arapahoe County has an estimated population of 600,000, a 300% increase in the past 45 years.

37) Q. Will Public Service purchase land or secure easements for the transmission line?

A. The land within the existing utility corridor alternative (20.5 miles) between Harvest Mile and Daniels Park Substations is primarily owned by PSCo in fee. After detailed design, it may be necessary to obtain some minimal amount of additional easement outside of the fee owned right-of-way. Any areas outside of the existing 210' fee owned right-of-way will require an easement that allows for surveying, construction, operation and maintenance of transmission and distribution lines across a defined strip of the landowner's property. All new easements will need to be acquired for those segments within the other two route alternatives between Harvest Mile and Daniels Park Substations that fall outside of the existing utility corridor (20.6 miles and 34.3 miles). The easement will be in the name of our operating company in Colorado, Public Service Company of Colorado.

38) Q. What activities can I expect in the corridor during line construction?

A. Line construction involves a series of distinct activities that are performed in sequence, including: vegetation clearing, installation of access roads and gates, staging the structures, foundation construction, framing and erecting the structures, stringing the wires, and clean-up and reclamation. Line construction work is not continuous; rather, it is conducted in phases so delays may be expected between portions of work.

39) Q. Will the public have any input on the route selection?

A. The project has three (3) possible route alternatives between the Harvest Mile and Daniels Park Substations including one that utilizes an existing transmission line corridor. PSCo will be conducting a second round of open house meetings in Arapahoe and Douglas Counties in the fall of 2015 to answer questions and ask for comments about the proposed route alternatives. The public assists by providing local knowledge regarding characteristics and resources of the study area. The preferences of the public are taken into account along with other criteria including engineering needs, maintenance requirements, environmental resources, and legal and economic considerations.

PSCo knows it is important to be a good neighbor and we hope to be well received by area residents who understand there is a strong need for the Project. We will make every effort to work through siting and other issues with the public, agencies, and other Project stakeholders.

It is important our siting process, public involvement efforts, environmental practices and engineering practices are transparent and acceptable to the public and agencies. We will continue to work with federal, state and local agencies as well as environmental organizations, individuals and private and public groups in order to address their concerns.

40) Q. Will substation modifications be necessary?

A. New 345kV termination equipment will be installed at three existing PSCo substations: Pawnee (1 termination), Daniels Park (2 terminations) and Missile Site (2 terminations), including associated breakers, switches, relays, and communication equipment. At this time, there appears to be adequate space within the existing substations and no additional land will be required. The construction of the new 345kV Harvest Mile Substation will also be included as part of the project.

41) Q. What permits will be required for the project?

A. There are a number of permits that must be obtained before the transmission line can be built. Based on a preliminary assessment of the project, the table below identifies the permits or approvals that may be required:

Permit Requirements

Jurisdiction	Permit/Decision/Action
Federal	
U.S. Army Corp of Engineers	Letter of Determination
Federal Aviation Administration	Obstruction Evaluation
Federal Highway Administration	Temporary Access & Crossing Agreements for Interstate 25
Union Pacific	Railroad Crossing License
State	
Colorado Department of Transportation	Utility/Special Use Permit Highway Crossings
Colorado Department of Transportation	Temporary Access Permit
Colorado Department of Public Health & Environment	Construction Stormwater Permit
Cities & Counties – Land Use	
Arapahoe County	Areas & Activities of State Interest (1041 Permit)
City of Aurora	Conditional Use Permit
Douglas County	Location & Extent
Town of Parker	Use by Special Review
Cities & Counties – Construction	
Douglas County	Floodplain Use Permit

Douglas County	Access or Right-of-Way Permit
Arapahoe County	Right-of-Way Use Permit
Arapahoe County	Floodplain Development Permit
City of Aurora	Utility Right-of-Way Permit
City of Aurora	Driveway Permit

42) Q. Can the transmission line be built underground?

A. The utilities must approach all projects from a prudent business position and as such are proposing overhead lines because of reliability and cost. The equivalent underground transmission line will cost 30 times more than the overhead line. The technology to build/operate lines underground for long distances is also extremely difficult to manage. Additionally, land purchases may be required. However, if the landowner, developer or jurisdiction pays for the differential in cost, and, if the feasibility analysis shows that it can be safely constructed and operated underground, PSCo will consider the request to build the line underground.

Building transmission lines underground significantly adds to the overall project cost. PSCo hired a consultant to do a cost analysis that considers the specific design parameters of this project so that we will have estimates for placing the line underground. The 2013 study by POWER Engineers to evaluate the construction of two generic one-mile sections of double circuit 345 kilovolt (kV) line in Parker estimated the cost to be between $79 million and $88 million;about $40 million per mile. The estimated cost of a 345kV double circuit overhead transmission line is $1 million to $2 million per mile.

Transmission lines (cables) are installed in two concrete-encased duct banks. Garage-sized concrete access structures (vaults) must be placed underground (3 per circuit) every 1,500 to 2,000 feet for splicing cables and repair of an underground line. At either end of an underground section in the overhead line, large two-acre transition stations (fenced mini-substations) need to be constructed.

345kV transmission lines generally require a 150-foot easement that can continue to be used for most existing activities. Underground transmission duct banks require a clear right-of-way of approximately 60 feet. An underground line must also be routed to avoid other underground installations, such as water, gas and sewer lines. Unstable slopes, hazardous material sites, wetlands and bedrock must be avoided. Going under a road, highway or river requires expensive construction techniques such as directional boring. The reactive losses of underground lines are substantially higher than overhead lines and may require less reliable equipment. Underground installation requires lengthy, disruptive construction techniques. Design concerns such as capacity and heat dissipation are frequent limitations.

<u>Technical Issues</u>

Cable - The most commonly used 345 kV underground cable systems are solid dielectric and high-pressure fluid-filled. For a fluid-filled system, once the cable has been installed in a steel pipe, the pipe is filled with a synthetic oil and pressurized with facilities at the terminals. This type of system is also trenched and covered with specialized backfill, sand or other type of soil.

Heat - Transmission lines generate heat when conducting electricity. With overhead lines, air cools the lines and keeps them at a safe operating temperature. Underground lines require cooling mechanisms, which increases cost and decreases reliability. Fluid-filled cable systems are cooled by oil in addition to placement of corrective backfill around the pipe for heat dissipation. Duct banks that contain a solid dielectric cable are encased by thermal concrete and the native soil to dissipate heat.

Repair and maintenance - Underground transmission lines can take much longer to repair than overhead lines. Estimates show that locating and repairing faults can take between two and eight weeks. Overhead lines can generally be repaired in a matter of hours or days after a failure occurs.

43) Q. Who will handle construction? Will local labor be used?

A. PSCo will competitively bid the proposed projects' construction to a list of pre-qualified contractors who are familiar with transmission line construction, minimizing impacts and respecting property rights. At the contractor's discretion, local labor may be used for less technical portions of the proposed projects.

44) Q. What are the proposed projects' socioeconomic benefits?

A. The proposed projects are expected to provide significant socioeconomic benefits to local residents as a result of a more reliable supply of power for businesses and agricultural operations. In addition, by providing a more robust transmission system for delivery of electric power (including renewable energy), the entire region will benefit from the proposed projects. Affordable, reliable electricity is the engine for economic growth.

The proposed projects will generate a broad array of public revenues from sales and property taxes and franchise, license and permit fees, and other charges. The ongoing revenues from the taxes and fees generated by the proposed projects will benefit the region and its residents.

45) Q. What hazards, environmental damage, or contamination could occur from transmission line construction or operation?

A. The proposed transmission line and substation modifications will not present hazards to the local community or the environment. The project will be constructed and operated to eliminate the potential for contamination. Environmental damage will be limited to site disturbances required for construction and operation of the project. When possible, aspects of project

construction, operation and maintenance will preserve natural resources. Construction plans, methods and practices are extremely important for the project and shall be designed to minimize damage to privately owned lands involved in the project. All work will, therefore, be performed in a manner that will minimize impacts to the landscape or sedimentation of surface waters. Disturbed areas will be returned to preconstruction conditions as much as possible or better.